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Food Quality Measurement System

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Abstract: ***Food poisoning has been the source of innumerable diseases and illnesses over the years. Unwary consumption of stale food results in ill health. In a country like India, where a majority of the population struggles for their daily bread, efficient preservation of existing food resources is critical.***
The need of the hour is to develop an efficient method to reduce the consumption of spoilt food. Extensive research to tackle the issue of food poisoning and reduce the damage to unwary consumers has given rise to innovative devices. The use of chemical, optical and electrical sensors to determine the staleness of food has proved to be a boon to consumers of packaged foods.
In this project, we attempt to develop a smart sensor device that can detect the freshness of household food items like dairy products, we can also use this device to check the quality of alcohol products and also some raw vegetables. This device consists of a variety of sensors that are activated depending on the food item. A mobile app can be designed specifically to receive data from the device to generate advance warnings regarding the status of the food item. We hope this idea will help in avoiding the consumption of degraded food and thus avoid the health problems led by consumption of bad quality food or alcohol
Index Terms

I. INTRODUCTION

Food freshness is a vital public health factor for the consumer as well as the food processing industry. The widespread of food borne pathogens poses higher levels of illness, causing numerous deaths and hospitalizations annually. Considerably, the increased quality awareness among consumers has given rise to the need of enhanced quality monitoring of food products in order to ensure the safety of food and community health. Nowadays, the traditional techniques of quality assessment are being replaced by computerised methods and thus, implementation of the same becomes quite important in analysing the food quality.

Though refrigerator is meant for storing the foodstuffs intact, but there is a need for more efficient ways of preserving and managing of food items. During the spoilage of food kept for a longer time duration, growth of microorganisms result in release of organic acids, volatile acidic and basic gases as well.

In this paper, we present an engineered system which has been programmed to sense what kind of stuff are present in the refrigerator and keeps a track on the stock.

This system will automatically determine when a food item is to be consumed before it expires and notifies the information on the LCD screen as well as to a wifi enabled smartphone, so that the remote user can be aware of the same. With this kind of an augmented mechanism, the food quality can be easily evaluated and at the same time, the system offers a clear instance of internet of things (IOT).

II. LITERATURE SURVEY

The study done by several researchers in the area of food quality detection and evaluation of the different food samples is an instance of human awareness towards technology based food consumption in the recent times. Most of the papers have considered texture, colour and humidity of the food as a major parameter towards analyzing the quality of food samples.

In the paper[1], food quality has been detected by using RFID scanning as the main basis for food quality inspection.

In the paper[2], the food quality on the basis of their weight has also been determined.

In the paper[3], the temperature has been used as an additional parameter to determine food quality of the food samples.

In the paper[4], here the food quality had been inspected by
the determination of parameters like moisture and alcohol
level as well.

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III. METHODOLOGY

The device has a camera, two types of sensors, usb to ttl cable and modules integrated in such away that the proposed tasks can be done in an efficient way. The entire unit is implemented with a quality based concept that checks the food samples in the form of pH and the gases (methanol, ethyl alcohol). The food samples stored in the different compartments of the refrigerator are continously monitored by using the physical quantities such as acidic/basic nature, amount of released gases and colour of the samples. The sensors and the Wifi module are interfaced with Arduino Uno microcontroller that becomes the controlling unit. The food samples to be tested in this process have unique parameters which will be helpful to differentiate the quality of the same.Thus, the control unit will analyze the time left for the food to be consumed before it expires and correspondingly, a message is send to the user's mobile phone to aware the person of the stored food samples. The technology of internet of things is implemented using a Wi-fi module in the embedded system, wherein the data can be sent to an android application as well via the internet.The mechanism works on the principle that whenever a deviation is recorded from the standard values, the microcontroller triggers the intended module and is commutated when the desired value is reached.

IV. BLOCK DIAGRAM

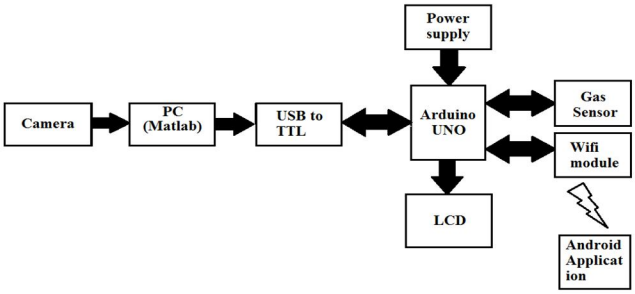

Fig.1 Block Diagram of the System

V. HARDWARE

1) *Camera:* A small webcam kind-of-an-camera is installed into the device. This camera will record the images of the food samples and the computer takes the images for analyzing the quality of the food samples.
2) *pH sensor:* A pH Meter is an instrument that measures the hydrogen-ion concentration in water-based solutions, indicating its acidity or alkalinity. Then the pH meter measures the difference in electrical potential between a pH electrode and a reference electrode, and so the pH meter is sometimes referred to as a "potentiometric pH meter".The difference in electrical potential relates to the acidity or pH of the solution.
3) *Gas Sensor:* The gas sensor used in this method is a MQ-135 gas sensor. MQ-135 sensor is manufactured by lead oxide (SnO2). This has a high sensitivity to Ammonia and Sulphide. It is also sensitive to smoke and other harmful gases.
4) *Wifi module:* It connects the user device to the main control unit i.e. arduino. Any data that obtained by the arduino is sent to the android application on user device through the wifi module.

VI. ADVANTAGES

A. Notifies the user on consumption of food before it expires through the android application, even when the user is away from the system.
B. Saves time that is spent on checking the expiry dates of every single foodstuff stored in the refrigerator.
C. Management of food items becomes more innovative as which food is to be consumed first than the other ones can be easily determined.

VII. CONCLUSION

Considering the positive side and the development this will bring to our daily life, convenience and comfort will be inevitable in our routines. This affects or impacts not the consumer or user alone but food manufacturers, food retailers, the product (refrigerator) manufacturers as well. According to present times, for users, it makes lifestyle easier, quick and efficient and of good quality as menu can be planed easily, short or no time is spent arranging item based on expiration, no food wastage, more efficient shopping and so on.

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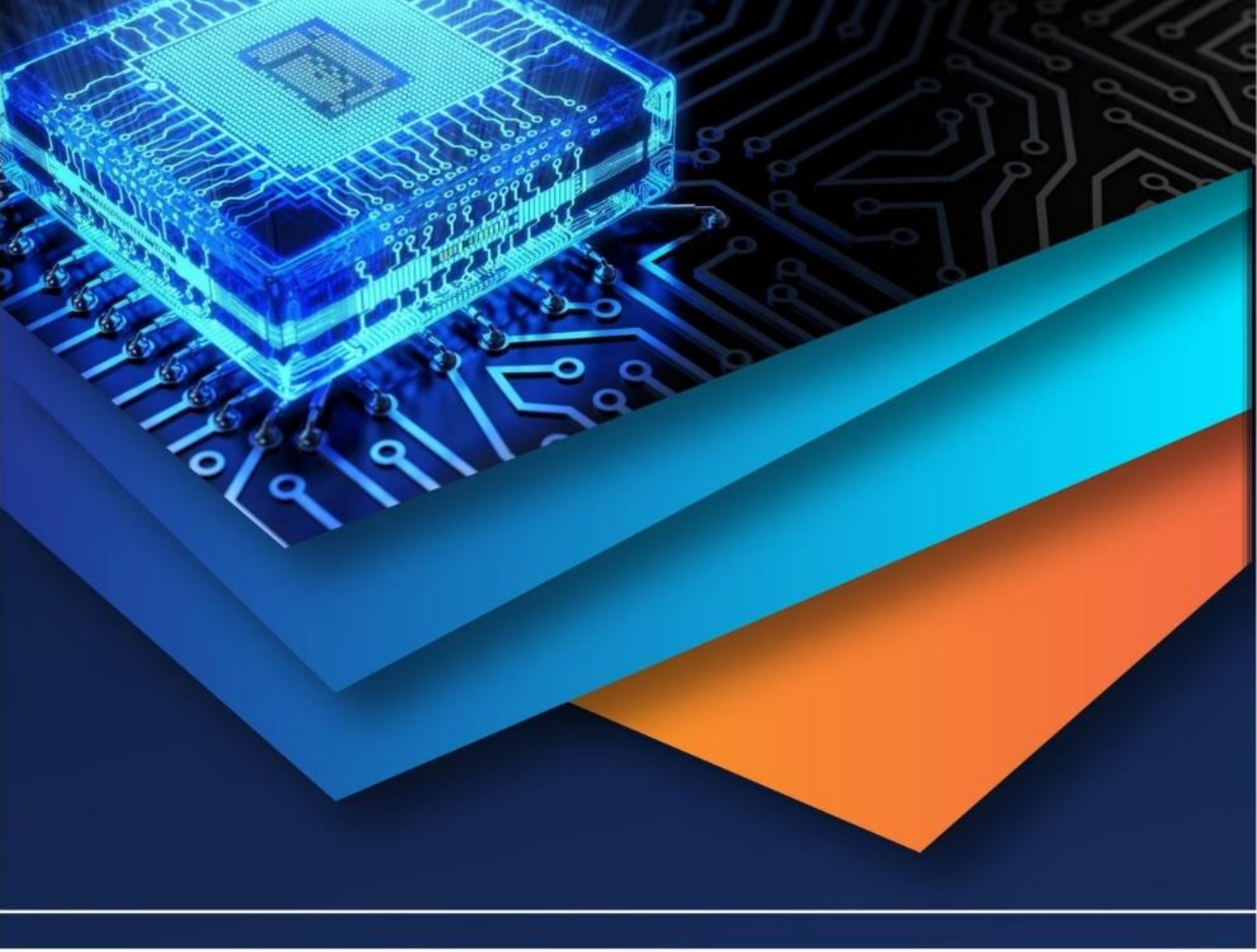

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